

REMARKS

Applicants agree to reopening the prosecution of this application.

Claims 8 and 9 have been rejected under 35 USC 112, second paragraph, as being indefinite as being product claims which depend from a process claim. Claim 8 has now been canceled, and Claim 9 has been rewritten in independent form, directed to a filtration device for liquid metal comprising a bed of refractory particulate electrofused corundum formed from grains having an open porosity between 5 and 30%.

Withdrawal of this rejection is requested.

Claim 8 has been rejected under 35 USC 102(b) as anticipated by or under 35 USC 103(a) as obvious over Neidhardt et al. In light of the cancellation of Claim 8, withdrawal of this rejection is requested.

Claims 1, 2, 4 and 6 have been rejected under 35 USC 103 over Pryor in view of JP 07-016698 and Robyn et al.

The Pryor reference has been cited to show that alumina has been used as a granular material in a filter bed for filtering molten metals. This is no more than the state of the art, as Pryor does not disclose or suggest the open porosity as presently claimed.

The Japanese reference discloses a mold structure in which a sand layer forming a cavity is constituted with spherical mullite ceramic grains having a grain diameter less than 0.5 mm and an apparent porosity $\leq 20\%$.

Robyn et al discloses a process for preparing a thermally insulated lining or cladding on a surface of a refractory wall or furnace or other structure exposed to high temperatures. According to the disclosure at column 10, lines 9 through 12, "the refractory mass formed on the surface of the wall has a total porosity estimated at about 70%, and an apparent

porosity, that is the part of the porosity due to the open pores, of approximately 38%."

The Office action alleges that Robyn et al teaches that apparent porosity is the same as open porosity, and that the open porosity of the granules of the Japanese reference is therefore less than 20%.

First, it is noted that neither the Japanese patent nor Robyn et al discloses the filtration of molten metal, and therefore these references taken together do not disclose or suggest filtering molten metal through a bed of refractory particulate material having the defined open porosity. There is, moreover, no reason why one of ordinary skill in the art would consider these references, not related to filtration, together with the Pryor reference, which is directed to filtration of molten metal.

Further, Applicants submit that Robyn et al does not suggest that the open porosity of the *grains* of the Japanese patent will be $\leq 20\%$. Robyn et al is directed to a particulate mixture which is exothermically projected onto a wall, causing silicon and aluminum particles to burn, releasing sufficient heat to melt at least part of the surface of refractory silica particles so they are welded together to form a porous refractory weld mass. See the paragraph bridging columns 9 and 10. It is this refractory mass which has an apparent porosity or porosity due to open pores of approximately 38% as defined at col. 10, lines 9-12.

This is not an open porosity of granules, however, but rather porosity formed by pores in a welded mass.

The definition of open porosity is given at column 8, lines 48 through 50, as pores which are penetrated by an immersion liquid in a specified test. Closed pores are defined as those pores which are not penetrated in this test.

Apparent porosity is defined in column 8, lines 43 through 47, as the ratio of the volume of open pores to the bulk volume of the body. If one applies this definition of apparent porosity to the Japanese patent, it is clear that the open porosity will comprise open pores of the grains plus the pores between the grains. The Japanese patent says nothing about the open porosity of the grains and it is not clear from reading the Abstract that there is any open porosity of the grains as defined in the claimed invention, since merely packing the bed in a particular manner can result in the defined apparent porosity.

Thus, contrary to the allegation in the Office Action, it is not possible to determine what the actual open porosity of the grains in the Japanese patent might be.

As the cited combination of references does not disclose or suggest filtering liquid metal utilizing a refractory particulate material formed from grains having an open porosity between 5 and 30%, withdrawal of this rejection is requested.

Claims 3 and 11 have been rejected under 35 USC 103(a) over Pryor in view of the Japanese patent and Robyn et al and further in view of Brezny. Brezny discloses porous ceramic beads having a specified pore size. However, as indicated in Example 5 of Brezny, the porosity is about 86 vol. % and there is no disclosure or suggestion of using refractory particulate material formed from grains having an open porosity between 5 and 30% to filter liquid metal.

Withdrawal of this rejection is requested.

Claims 1, 4, 5, 7 and 9 have been rejected under 35 USC 103(a) over Hess et al in view of Neidhardt et al.

Both of these references have been discussed in detail in the previous responses and in the appeal brief.

Hess et al discloses a filtration method for liquid metal in which the liquid metal is passed through a bed of refractory particulate material, with no porosity being disclosed for the refractory particles. Tabular alumina (synthetic corundum) is the preferred material disclosed at column 2, lines 46-47. The disclosure of this reference corresponds generally to the state of the art, according to the present specification.

The Neidhardt et al reference is alleged to teach corundum made by the same method as that of the Applicant, and it is alleged that the particulate material of Neidhardt et al would therefore have the same porosity as the filter bed of the invention.

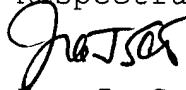
Neidhardt et al discloses production of electrically-fused corundum, but does not disclose the open porosity of such granules of corundum, and does not suggest utilizing particles having the claimed open porosity for filtration of molten metal. No evidence has been presented that electro-fused corundum inherently has a porosity as presently claimed. Moreover, even assuming *arguendo* that the corundum disclosed by Neidhardt et al had such a porosity, there is no disclosure or suggestion that utilizing such a material for filtering molten metal improves the rate of removal of inclusions while reducing the residence time. These improvements have been established in the examples of the present specification in a manner sufficient to rebut any case of *prima facie* obviousness which is alleged to have been established by these references.

Thus, Applicants submit that the cited combination of references would not lead one of ordinary skill in the art to utilize refractory grains having an open porosity of 5 to 30% for filtration of molten metal in order to improve removal of inclusions and reduce residence time. Withdrawal of this

rejection is accordingly requested.

In view of the foregoing amendments and remarks, Applicants submit that the present application is now in condition for allowance. An early allowance of the application with amended claims is earnestly solicited.

Respectfully submitted,



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